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ESKOM SOC LTD

ENVIRONMENTAL IMPACT ASSESSMENT, WASTE MANAGEMENT LICENSE AND WATER USE LICENSE APPLICATION FOR THE 30 YEAR ASH DISPOSAL FACILITIES AT KENDAL POWERSTATION

16 April 2015 at 13H30, DWS Sedibeng Building

DWS Meeting Regarding Engineering Design

Project No : 12935

ACTION

1. Present

Jyothika Heera (JH)	Zitholele Consulting
Tania Oosthuizen (TO)	Zitholele Consulting
Nevin Rajasakran (NR)	Zitholele Consulting
Eddie Setei (ES)	Eskom
Andre Kreuiter (AK)	Eskom
Kelvin Legge (KL)	DWS
Michelle Parker (MP)	DWS
Keith Mnisi (KM)	DWS
Boitomeo Seake (BS)	DWS
Claire Fricker (CF)	DWS
Mpho Nevondo (MN)	DWS
Malise Noe (MN)	DWS
Rendani Ndou (RN)	DWS

2. Presentation

JH handed out a presentation to the attendees. Please refer to presentation attached hereto.

3. Purpose of the meeting

TO explained that the purpose of the meeting was to present the proposed conceptual engineering design of the Kendal 30 year Ash Disposal Facility (ADF) project. She explained that following a rigorous site selection process, Site H was selected as the preferred site. It is the site closest to the Kendal power station and least affected by mining activities.

4. Proposed design

JH went through the slides explaining the deviation of infrastructure, the waste classification and barrier system design, the falling head permeability results of the liner design, the capping design and the water balance.

5. Discussion of Drawings

5.1 NR explained the proposed liner design. KM explained that DWS is looking for a composite effect, so that in case there is a hole in the geomembrane, there is clay to assist with the leakage. However, the A10 beneath the geomembrane will have an effect on transmissivity and cause the leak to spread out. KM explained that the DWS therefore recommends that the A10 be removed. NR explained that the CQA must then be spot on. KL explained that a full drum roll will be required on the final layer below the 2mm geomembrane. KL enquired whether a double textured HDPE geomembrane will be used. KL stated that the most important will be for the CQA to be implemented properly.

ACTION

5.2 KL advised that construction is always difficult, and that Zitholele specified a non-woven needle punch of 200g/m^2 A4 over the cuspated system. KL asked NR how he intends to join the geotextile without letting it blow in the wind. He asked if it will be continuous over the whole area and stitched or whether it will be heat seamed.

NR enquired whether KL was referring to the biddim which KL confirmed. NR stated that the proposal is not to leave the biddum there for a long time. The fly ash must be blended into the *in situ* material and used to cover up the biddum to protect it. KL stated that the design is fine. He warned that the construction method will have to address what the contractor must do to avoid the biddum blowing around before the pioneer layer with the fly ash blend is placed. KL stated that there are various options to address this: boulders, stitching, heat seaming etc. KL stated that this detail must be addressed in the CQA plan.

5.3 KL requested to discuss the details of the toe of the sidewall. He asked whether there are any paddocks. NR explained that there is a solution trench which decants to the pollution control dams via the silt traps. NR explained that the paddocks are concrete lined. KL enquired how the paddocks decant. NR explained that pipes will be put in on the facility itself, on each level and they will decant into pipes. Down the sides there will be pipes ….. into the solution trenches and they will be open channel right down to the pollution control dams. KL suggested that where they decant into the solution trench that Zitholele includes an upstand in the pipe, or provide for the pipe not to decant from the invert level. He stated that this will provide an early sediment trap, so material is not conveyed down to the sediment trap and then brought up. KL stated that making use of this as a sediment trap will saves a lot of material volume to manage.

5.4 KM enquired about the A4 biddum on top of the cuspated sheets, on the drawing it says that it is strips. NR explained that it is not fully over the cuspated drains but only over the gaps.

5.5 JH explained the drawings of the pollution control dams. KL enquired which dams are higher than 5m wall height. NR responded that there are about 2 or 3 dams. The capacities are in the order of about 190 Mℓ. NR confirmed that a dam safety engineer will be required during detail design.

5.6 KM went through the drawing of the silt trap. NR explained that the design is such so that it can be contained by a skid steer. He further explained that the adjustable weir is to ensure that silt does not get into it, but it also depends on the operation and maintenance of it.

5.7 With regards to the pollution control dams liner, NR explained that the only difference in design (from the ADF) is that it will not have a leachate collection system. KM confirmed that on the PCD's there will be a 1.5 mm geomembrane. KM enquired what will be used for the ballast. NR replied that we propose to use a stabilised layer of 300 mm. NR explained that if it is the same *in situ* material we will use a 2 mm layer. He explained that this is the give and take. If we get less than 10^{-7} cm/second then we will use the 2 mm layer. KL warned against using two different geomembranes on site because accidents can happen and people can put the wrong thing in the wrong place. The detailed drawing of the dam liner system was not available. JH will send the drawing to DWS.

5.8 JH discussed the Emergency Dump. KM read out the make-up of the liner system. NR stated that the 200 mm thick RC bed mentioned on the drawing should be changed to fibre reinforced concrete. NR explained that Zitholele does not use mesh anymore, because in terms of construction it is too difficult. Zitholele currently uses 600 -800 g/m^3 ^{of} polypropelyne fibres to reduce shrinkage in concrete . It is in cast in panels of 25 x 25 and saw cut joints are cut at 5m x 5m. KL enquired if it is partial cuts. Nevin affirmed that it is 30 mm.

ACTION

5.9 NR stated that the conveyor system will also be concrete lined. KL enquired whether all the concrete lined channels will be fibre reinforced. NR confirmed that they will be.

5.10 KM enquired whether this is a pre-application meeting. TO responded that it is a pre-application meeting. She added that Zitholele is currently waiting for a WUL to perform drilling in order to undertake the surface and groundwater interaction study. She explained that this is what is currently holding up the programme. Zitholele would like to include this study in the EIA and IWULA. She added that Zitholele hopes to submit in June / July 2015.

5.11 KM enquired what will be done on the clean water dams. NR explained that the soils will be compacted, but that there will be no liner system.

5.12 The capping was discussed. NR explained that the reason for the soil saver on top of the ash body retains water and facilitates dust suppression .

KL enquired whether any strength tests have been done on the existing facility's ash after about five years. NR explained that tests are currently being undertaken on the ash. He stated that the results will be sent to KL when they become available.

KL enquired about the sideslopes of the rehabilitated areas. NR explained that the advancing face is sloped at 1:1.5. After passing this point the slopes are down (with a cut and fill) to 1:5. Benches for drains will be put in. KL stated that it is much flatter than he thought. He stated that the reason why he asked was about block stability.

5.13 KM enquired whether a CQA plan is included in the design report. JH indicated that it is not yet included but, will be submitted to DWS together with the outstanding drawings by 23 April 2015. KL stated that the CQA is critical. He stated that it is very easy to deal with in terms of the SANS or GRIM13 standards. DWS prefer the GRIM13 now that it has been amended. The geotextiles are also easy to deal with. The CQA author should be careful to specify the performance they require from the cuspated system because there isn't a South African standard for that. KL advises that there are products on the world market that will only last a few minutes. He stated that they are not concerned with crushing strengths at this stage because this design has the fly ash blend which will provide stability.

6. KM thanked everyone for their time and closed the meeting.

DATE: 22 April 2015

SIGNATURE: 

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KENDAL POWER STATION 30 YEAR ASH DISPOSAL FACILITY

CONCEPTUAL ENGINEERING DESIGN

DEPARTMENT OF WATER & SANITATION
16 APRIL 2015

PRESENTED BY:
TANIA GOSTHUIZEN – ZC ENVIRONMENTAL
&
JYOTHIKA HEERA – ZC ENGINEERING

Layout of Presentation

- Introduction and Background
- Deviation of Infrastructure
- Geology – Site H
- Groundwater – Site H
- Waste classification
- Liner design
- Capping
- Water Balance Modelling
- Clean Water Dams
- Layout
- Presentation of drawings

Introduction & Background

- Zitholele is appointed by Eskom for two Ash Disposal Facility (ADF) Projects:
  - Kendal Continuous
  - Kendal 30 year
- The Kendal Continuous project entails the continuation of the existing ADF. The Kendal 30 year project is for an additional, new facility required to accommodate the ash up to **2058**;
- The Kendal Continuous EIA, WML and IWULA was submitted in September 2014;
- The Kendal 30 year site will need to accommodate **176.2 Mm^3** of ash;
- The deposition rate will be **539,000m^3/month**;
- The maximum height of the ADF will be **75 m**;
- Life of operation will be **27 years**, and construction will start in **2025**;
- Rigorous site selection has been undertaken, with Site H emerging as the preferred site. Issues with the other sites relate mainly to current and future mining activities;
- Site H is the closest to Kendal Power Station of all the sites investigated.

1

Deviation of Infrastructure

- In order to construct the Site H ADF, the following infrastructure will have to be deviated:
  - The D1390 (gravel road);
  - Distribution lines: 11kV, 22kV, 88kV, 132kV;
  - Transmission line: 400 kV;
  - Transnet 18'' fuel pipeline.

2

Geology – Site H

- Most of Site H is underlain by pedogenic ferricrete of either nodular or hardpan ferricrete;
- Various sedimentary units of the Vryheid Formation, Karoo Supergroup, namely sandstone and shale were found to occur at some of the test positions;
- Intrusive rocks of the Rooiberg Suite were encountered in two trial pits on the southern portion of the site;
- The natural geology and ground profile of the site comprises of sandstones and mudstones of the Vryheid Formation, overlain by residual soils, which in turn are overlain by transported soils of colluvial origin;
- The Ogies Dyke crosses west-east through the north-western corner of the site;
- No signs of outcropping rock or dykes were observed on site.

3

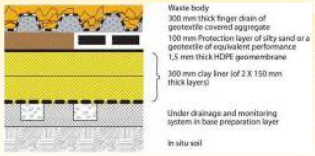
Groundwater – Site H

- The average recharge for Site H is indicated as ranging between 50mm to 75mm per annum;
- The aquifer is classified as a minor aquifer system;
- The aquifer type is indicated as intergranular and fractured;
- The average borehole yield in the area is indicated as ranging between 0.5l/s and 2.0l/s;
- Groundwater vulnerability is indicated as low to medium;
- Groundwater flow mimics the topography;
- Site H's groundwater samples are all below the SANS 241 (2011) drinking water compliance standards except for the reported nitrate concentration which exceeds the drinking water compliance limit of 11.0mg/l;
- Zitholele is planning to undertake a surface and groundwater interaction study – which will feed into the final design report. ZC is currently awaiting water use licence.

4

Waste Classification

- Waste classified as Type 3 (low hazard) in terms of DEA's waste classification regulations;
- This classification was the result of the leachable concentration of boron and the total concentration of barium and fluoride in the ash;
- Disposal on a Class C barrier system is proposed;
- Ash is below limit set for material to be considered as radioactive.



Typical Class C Landfill Barrier System

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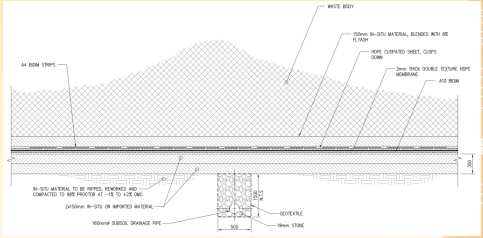
Liner Design



6

Liner Design – Falling Head Permeability Test Results

Lab. Sample Reference	Field Sample Reference	Depth (m)	Moisture Contents Before Test (%)	Moisture Contents After Test (%)	Dry density Kg/m³ Initial	Dry density Kg/m³ As tested	Coefficient of Permeability (m/s) Range Minimum	Range Maximum	Average
858-1	C1 + C3	-	18.9	20.4	1619	1653	2.6E-08	3.8E-08	**3.2E-08**
858-2	C1 + C3	4% Bentonite	18.1	18.8	1716	1754	1.3E-10	2.1E-10	**1.7E-10**
858-3	C1 + C3	8% Bentonite	21.5	26.2	1636	1696	3.9E-11	2.8E-10	**1.4E-10**
858-4	C2	-	37.7	44.5	1070	1160	7.3E-07	1.9E-06	**1.1E-06**
858-5	H1	-	8.6	11.7	1928	1954	9.3E-08	1.4E-07	**1.2E-07**
858-6	H1	4% Bentonite	9.1	13.4	1906	1929	1.7E-10	2.2E-10	**1.9E-10**
858-7	H1	8% Bentonite	10.5	14.1	1851	1909	2.0E-10	3.0E-10	**2.5E-10**
858-8	H2	-	14.0	15.4	1798	1794	2.1E-09	9.9E-09	**4.9E-09**
858-9	H2	4% Bentonite	16.0	19.2	1759	1780	2.2E-10	3.3E-10	**2.7E-10**
858-10	H2	8% Bentonite	16.2	20.6	1749	1789	4.9E-11	7.6E-11	**6.4E-11**

Remarks: Samples remoulded to approximately 95% Proctor.
Saturated and tested under a load of 100kPa.
Densities reported are under a load of 100kPa.

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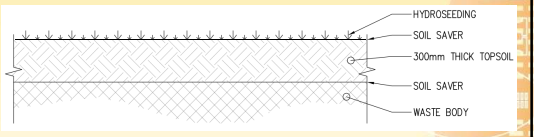
Capping



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Water Balance Modelling (WBM) - Objectives

- The objective of the water balance modelling was to size the new Ash Water Return Dam to be in compliance with Government Notice 704. More specifically, Clause 6 (d) of the regulation indicates that:

Design, construct, maintain and operate any dirty water system at the mine or activity so that it is not likely to spill into any clean water system more than once in 50 years.

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WBM – Modelling Approach & Assumptions

- A 50 year daily time step model was set up using Microsoft, Excel;
- 50 year rainfall data;
- Existing & New dam stage curves;
- Operating flows;
- The water balance model included the existing Dirty Water Dam, Emergency Dirty Water Dam and Clean Water Dam, as well as 7 proposed new dams that were identified.

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WBM – Modelling Approach & Assumptions (contd.)

Inputs	Outputs
Rain water runoff	Evaporation
Direct rain	Process water out
Process water in	Dust Suppression
	Irrigation

Rainfall Data	
Rainfall Station Name:	Welgelegen, Ermelo
Rainfall Station Number:	0480170-4
Distance to Camden PS:	17 km
Rainfall data period used from Rainfall Station:	June 1964 – October 2006
Rainfall data period used from Camden Power Station:	November 2006 – June 2014
Rainfall period used:	50 Years

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WBM - Results

Pollution Control Dams		
Dam	Capacity (ML)	Comments
1	135	Capacity includes 2 days storage for dust suppression water
2	9.75	E-dump dam
4	135	
6	90	
7	130	

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Clean Water Dams

Clean Water Dams		
Dam	Capacity (ML)	Comments
3	158	Sized for a 1:50 year storm event
5	197	Sized for a 1:50 year storm event

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Layout

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Presentation & Discussion of Drawings

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ENVIRONMENTAL IMPACT ASSESSMENT (EIA) AND WASTE MANAGEMENT LICENSE APPLICATION FOR THE PROPOSED 30 YEAR ASH DISPOSAL FACILITY AT KENDAL POWER STATION

DEA Ref No 14/12/16/3/3/3/68; NEAS Reference: DEA/EIA/0001624/2013

DWS meeting -Engineering

Thursday, 16 April 2015, 13:30am to 14:15pm

DWS Head office, Room 501, Sedibeng Building

ATTENDANCE REGISTER

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